WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

a lower hydrogen-barrier film;

one or more capacitors each formed on the lower hydrogen-barrier film;

a first interlayer dielectric film formed so as to cover the capacitor, and expose the lower hydrogen-barrier film where the lower hydrogen-barrier film is located near the peripheral portion of the capacitor; and

an upper hydrogen-barrier film formed on the first interlayer dielectric film and on the exposed portion of the lower hydrogen-barrier film,

wherein the upper hydrogen-barrier film is in contact with the lower hydrogen-barrier film where the upper hydrogen-barrier film is located near the peripheral portion of the capacitor, and

the lateral faces of the first interlayer dielectric film, which cover the lateral portions of the capacitor, form an obtuse angle with the lower hydrogen-barrier film.

2. A semiconductor device comprising:

a lower hydrogen-barrier film;

one or more capacitors, each formed on the lower hydrogen-barrier film and including a lower electrode, a capacitive insulating film, and an upper electrode;

a first interlayer dielectric film formed so as to cover the capacitor; and

an upper hydrogen-barrier film covering the top and lateral portions of the capacitor,

wherein an opening, which exposes the lower hydrogen-barrier film where the lower hydrogen-barrier film is located around the capacitor, and which is tapered and flares upward, is formed in the first interlayer dielectric film, and

the upper hydrogen-barrier film is formed along the lateral and bottom faces of the opening, and is in contact with the lower hydrogen-barrier film in the opening.

3. The semiconductor device of Claim 2, wherein the lower electrode, capacitive insulating film, and upper electrode of the capacitor have a cross-sectional configuration that is tapered and flares upward.

4. The semiconductor device of Claim 2, further comprising:

a second interlayer dielectric film formed on the first interlayer dielectric film so as to cover the capacitor,

wherein an open trench, which exposes the lower hydrogen-barrier film, is formed in the first interlayer dielectric film, and

the upper hydrogen-barrier film includes a first hydrogen-barrier film and a second hydrogen-barrier film, wherein the first hydrogen-barrier film having a cross section of a recess is formed along the open trench, while the second hydrogen-barrier film is formed on the second interlayer dielectric film and the end portion of the second hydrogen-barrier film is connected to the first hydrogen-barrier film.

5. The semiconductor device of Claim 2, further comprising:

a second interlayer dielectric film formed over the first interlayer dielectric film so as to cover the upper hydrogen-barrier film, and

a third interlayer dielectric film formed on the second interlayer dielectric film and located to the lateral portion of the capacitor,

wherein a lower contact plug, which passes through the second interlayer dielectric film, is formed in a region of the second interlayer dielectric film which is located to the

lateral portion of the capacitor, and

an upper contact plug is formed in a region of the third interlayer dielectric film which is located to the lateral portion of the capacitor, wherein the upper contact plug passes through the third interlayer dielectric film and is electrically connected with the lower contact plug.

6. The semiconductor device of Claim 2, wherein the lower hydrogen-barrier film or the upper hydrogen-barrier film is made of an insulative material, and

the insulative material is made of silicon nitride, silicon oxynitride, aluminum oxide, titanium aluminum oxide, tantalum aluminum oxide, titanium silicate oxide, or tantalum silicate oxide.

7. The semiconductor device of Claim 2, wherein an oxygen-barrier film for preventing oxygen diffusion is provided under the capacitor.

8. The semiconductor device of Claim 7, wherein the oxygen-barrier film is made of iridium, iridium oxide, ruthenium, or ruthenium oxide.

9. The semiconductor device of Claim 7, wherein the oxygen-barrier film is made of any one of an iridium oxide film, a multilayer film composed of an iridium film and an iridium oxide film that are sequentially formed from the lowermost layer, a ruthenium oxide film, and a multilayer film composed of a ruthenium film and a ruthenium oxide film that are sequentially formed from the lowermost layer, or is made of a multilayer film that includes at least two of these films.

10. The semiconductor device of Claim 2, wherein a conductive lower hydrogen-barrier film for preventing hydrogen diffusion is provided under the capacitor.

11. The semiconductor device of Claim 10, wherein the conductive lower hydrogen-barrier film is made of titanium aluminum nitride, titanium aluminum, titanium silicide nitride, tantalum nitride, tantalum silicide nitride, tantalum aluminum nitride, or tantalum aluminum.

12. The semiconductor device of Claim 10, wherein the conductive lower hydrogen-barrier film is made of a multilayer film that includes at least two of a titanium aluminum nitride film, a titanium aluminum film, a titanium silicide nitride film, a tantalum nitride film, a tantalum silicide nitride film, a tantalum aluminum nitride film, and a tantalum aluminum film.

13. The semiconductor device of Claim 10, wherein the conductive lower hydrogen-barrier film includes a multilayer film composed of a first conductive barrier layer for preventing oxygen diffusion and hydrogen diffusion, and a second conductive barrier layer for preventing oxygen diffusion.

14. The semiconductor device of Claim 2, wherein a plurality of the capacitors are arranged in a row to form a capacitor row, and the upper electrodes forming the capacitor row are connected with each other to form a cell plate, and

the capacitors are covered in cell-plate units by the upper hydrogen-barrier film.

15. The semiconductor device of Claim 2, wherein a plurality of the capacitors are

arranged to form a block, and

the capacitors are covered in block units by the upper hydrogen-barrier film.

16. The semiconductor device of Claim 2, wherein a plurality of the capacitors are arranged in a matrix to form a capacitor array, and

the capacitors are covered in capacitor-array units by the upper hydrogen-barrier film.

17. The semiconductor device of Claim 2, wherein a plurality of the capacitors are arranged in rows to form capacitor rows, and the upper electrodes forming each said capacitor row are connected with each other to form a cell plate,

the capacitor rows are arranged to form blocks, and the blocks are arranged to form a capacitor array, and

the capacitors are covered by the upper hydrogen-barrier film in cell-plate units, block units, or capacitor-array units, or are covered in a mixture of the cell-plate units and the block units.

18. The semiconductor device of Claim 2, wherein a plurality of the capacitors are arranged, and

among the capacitors, capacitors located adjacent to the peripheral portion of the upper hydrogen-barrier film are non-actuating dummy capacitors that do not operate electrically.

19. The semiconductor device of Claim 2, further comprising:

a cell-selecting transistor formed in a semiconductor substrate, and

a bit line formed over the semiconductor substrate, the bit line being electrically connected with the cell-selecting transistor,

wherein the bit line is connected with another interconnect where the bit line is located outside the lower and upper hydrogen-barrier films.

20. The semiconductor device of Claim 19, wherein the bit line is formed underneath the lower hydrogen-barrier film.

21. The semiconductor device of Claim 19, wherein the bit line is formed between the lower hydrogen-barrier film and the semiconductor substrate.

22. The semiconductor device of Claim 19, wherein the bit line is formed under the lower hydrogen-barrier film so as to be in contact with the lower hydrogen-barrier film.

23. The semiconductor device of Claim 2, wherein the upper electrode of the capacitor and the upper hydrogen-barrier film are in contact with each other.

24. The semiconductor device of Claim 2, further comprising an interconnect formed directly on the upper hydrogen-barrier film.

25. The semiconductor device of Claim 2, further comprising:

a cell-selecting transistor formed in a semiconductor substrate and having a source region and a drain region;

a second interlayer dielectric film formed on the semiconductor substrate and covering the cell-selecting transistor; and

a contact plug in the second interlayer dielectric film, the contact plug electrically connecting the lower electrode with the source region or the drain region.

26. The semiconductor device of Claim 2, further comprising:

a plurality of cell-selecting transistors formed in a semiconductor substrate,

wherein a plurality of the capacitors are ranged to form capacitor rows, while the upper electrodes of the capacitors are connected with each other to form cell plates;

the cell-selecting transistors are electrically connected with the capacitors by contact plugs;

the capacitor rows include conducting dummy capacitors that are the same in structure as the capacitors; and

an upper electrode and a lower electrode in each said conducting dummy capacitor are electrically connected with each other, so that the cell plates are electrically connected with the semiconductor substrate via the contact plugs.

27. The semiconductor device of Claim 26, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the conductive lower hydrogen-barrier films are formed on the insulative lower hydrogen-barrier film so as to cover the upper surfaces of the contact plugs.

28. The semiconductor device of Claim 27, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-

barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the end faces of the conductive lower hydrogen-barrier films are in contact with the insulative lower hydrogen-barrier film.

29. The semiconductor device of Claim 28, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the conductive lower hydrogen-barrier films are formed on the lateral faces of the contact plugs, so that the conductive lower hydrogen-barrier films are in contact with the insulative lower hydrogen-barrier film.

30. The semiconductor device of Claim 2, wherein the lower electrode or the upper electrode contains an element of the platinum group.

31. The semiconductor device of Claim 2, wherein the capacitive insulating film is made of a substance, which is expressed by the general formula $SrBi_2(Ta_xNb_{1-x})_2O_9$, $Pb(Zr_xTi_{1-x})O_3$, $(Ba_xSr_{1-x})TiO_3$, $(Bi_xLa_{1-x})_4Ti_3O_{12}$ (wherein $0 \leqq x \leqq 1$ in the formulas), or Ta_2O_5.

32. A semiconductor device comprising:

a lower hydrogen-barrier film;

one or more capacitors, each formed on the lower hydrogen-barrier film and including a lower electrode, a capacitive insulating film, and an upper electrode;

a first interlayer dielectric film formed so as to cover the capacitor; and

an upper hydrogen-barrier film covering the top and lateral portions of the capacitor,

wherein an open trench, which exposes the lower hydrogen-barrier film where the lower hydrogen-barrier film is located around the capacitor, is formed in the first interlayer dielectric film, and

the upper hydrogen-barrier film has a portion in the form of a recess formed along the open trench, and the recess-shaped portion is in contact with the lower hydrogen-barrier film.

33. The semiconductor device of Claim 32, wherein the recess of the upper hydrogen-barrier film has a cross-sectional configuration that is tapered and flares upward.

34. The semiconductor device of Claim 32, wherein the upper hydrogen-barrier film is filled in the recess.

35. The semiconductor device of Claim 32, wherein the lower electrode, capacitive insulating film, and upper electrode of the capacitor have a cross-sectional configuration that is tapered and flares upward.

36. The semiconductor device of Claim 32, further comprising:

a second interlayer dielectric film formed on the first interlayer dielectric film so as to cover the capacitor,

wherein an open trench, which exposes the lower hydrogen-barrier film, is formed in the first interlayer dielectric film, and

the upper hydrogen-barrier film includes a first hydrogen-barrier film and a second hydrogen-barrier film, wherein the first hydrogen-barrier film having a cross section of a recess is formed along the open trench, while the second hydrogen-barrier film is formed on the second interlayer dielectric film and the end portion of the second hydrogen-barrier film is connected to the first hydrogen-barrier film.

37. The semiconductor device of Claim 32, further comprising:

a second interlayer dielectric film formed over the first interlayer dielectric film so as to cover the upper hydrogen-barrier film, and

a third interlayer dielectric film formed on the second interlayer dielectric film and located to the lateral portion of the capacitor,

wherein a lower contact plug, which passes through the second interlayer dielectric film, is formed in a region of the second interlayer dielectric film which is located to the lateral portion of the capacitor, and

an upper contact plug is formed in a region of the third interlayer dielectric film which is located to the lateral portion of the capacitor, wherein the upper contact plug passes through the third interlayer dielectric film and is electrically connected with the lower contact plug.

38. The semiconductor device of Claim 32, wherein a plurality of open trenches, which expose the lower hydrogen-barrier film, are formed in parallel with each other in the first interlayer dielectric film, and

the upper hydrogen-barrier film has portions that are each in the form of a recess,

and are formed along the open trenches, where the upper hydrogen-barrier film is located to the lateral portion of the first interlayer dielectric film, and the respective recess-shaped portions are in contact with the lower hydrogen-barrier film.

39. The semiconductor device of Claim 32, wherein the lower hydrogen-barrier film or the upper hydrogen-barrier film is made of an insulative material, and

the insulative material is made of silicon nitride, silicon oxynitride, aluminum oxide, titanium aluminum oxide, tantalum aluminum oxide, titanium silicate oxide, or tantalum silicate oxide.

40. The semiconductor device of Claim 32, wherein an oxygen-barrier film for preventing oxygen diffusion is provided under the capacitor.

41. The semiconductor device of Claim 40, wherein the oxygen-barrier film is made of iridium, iridium oxide, ruthenium, or ruthenium oxide.

42. The semiconductor device of Claim 40, wherein the oxygen-barrier film is made of any one of an iridium oxide film, a multilayer film composed of an iridium film and an iridium oxide film that are sequentially formed from the lowermost layer, a ruthenium oxide film, and a multilayer film composed of a ruthenium film and a ruthenium oxide film that are sequentially formed from the lowermost layer, or is made of a multilayer film that includes at least two of these films.

43. The semiconductor device of Claim 32, wherein a conductive lower hydrogen-barrier film for preventing hydrogen diffusion is provided under the capacitor.

44. The semiconductor device of Claim 43, wherein the conductive lower hydrogen-barrier film is made of titanium aluminum nitride, titanium aluminum, titanium silicide nitride, tantalum nitride, tantalum silicide nitride, tantalum aluminum nitride, or tantalum aluminum.

45. The semiconductor device of Claim 43, wherein the conductive lower hydrogen-barrier film is made of a multilayer film that includes at least two of a titanium aluminum nitride film, a titanium aluminum film, a titanium silicide nitride film, a tantalum nitride film, a tantalum silicide nitride film, a tantalum aluminum nitride film, and a tantalum aluminum film.

46. The semiconductor device of Claim 43, wherein the conductive lower hydrogen-barrier film includes a multilayer film composed of a first conductive barrier layer for preventing oxygen diffusion and hydrogen diffusion, and a second conductive barrier layer for preventing oxygen diffusion.

47. The semiconductor device of Claim 32, wherein a plurality of the capacitors are arranged in a row to form a capacitor row, and the upper electrodes forming the capacitor row are connected with each other to form a cell plate, and

the capacitors are covered in cell-plate units by the upper hydrogen-barrier film.

48. The semiconductor device of Claim 32, wherein a plurality of the capacitors are arranged to form a block, and

the capacitors are covered in block units by the upper hydrogen-barrier film.

49. The semiconductor device of Claim 32, wherein a plurality of the capacitors are arranged in a matrix to form a capacitor array, and

the capacitors are covered in capacitor-array units by the upper hydrogen-barrier film.

50. The semiconductor device of Claim 32, wherein a plurality of the capacitors are arranged in rows to form capacitor rows, and the upper electrodes forming each said capacitor row are connected with each other to form a cell plate;

the capacitor rows are arranged to form blocks, and the blocks are arranged to form a capacitor array; and

the capacitors are covered by the upper hydrogen-barrier film in cell-plate units, block units, or capacitor-array units, or are covered in a mixture of the cell-plate units and the block units.

51. The semiconductor device of Claim 32, wherein a plurality of the capacitors are arranged, and

among the capacitors, capacitors located adjacent to the peripheral portion of the upper hydrogen-barrier film are non-actuating dummy capacitors that do not operate electrically.

52. The semiconductor device of Claim 32, further comprising:

a cell-selecting transistor formed in a semiconductor substrate, and

a bit line formed over the semiconductor substrate, the bit line being electrically connected with the cell-selecting transistor,

wherein the bit line is connected with another interconnect where the bit line is

located outside the lower and upper hydrogen-barrier films.

53. The semiconductor device of Claim 52, wherein the bit line is formed underneath the lower hydrogen-barrier film.

54. The semiconductor device of Claim 52, wherein the bit line is formed between the lower hydrogen-barrier film and the semiconductor substrate.

55. The semiconductor device of Claim 52, wherein the bit line is formed under the lower hydrogen-barrier film so as to be in contact with the lower hydrogen-barrier film.

56. The semiconductor device of Claim 32, wherein the bottom of the recess of the upper hydrogen-barrier film is in contact with the lower hydrogen-barrier film.

57. The semiconductor device of Claim 32, wherein the upper electrode of the capacitor and the upper hydrogen-barrier film are in contact with each other.

58. The semiconductor device of Claim 32, further comprising an interconnect formed directly on the upper hydrogen-barrier film.

59. The semiconductor device of Claim 32, further comprising:

a cell-selecting transistor formed in a semiconductor substrate and having a source region and a drain region;

a second interlayer dielectric film formed on the semiconductor substrate and covering the cell-selecting transistor; and

a contact plug in the second interlayer dielectric film, the contact plug electrically connecting the lower electrode with the source region or the drain region.

60. The semiconductor device of Claim 32, further comprising:

a plurality of cell-selecting transistors formed in a semiconductor substrate,

wherein a plurality of the capacitors are ranged to form capacitor rows, while the upper electrodes of the capacitors are connected with each other to form cell plates;

the cell-selecting transistors are electrically connected with the capacitors by contact plugs;

the capacitor rows include conducting dummy capacitors that are the same in structure as the capacitors; and

an upper electrode and a lower electrode in each said conducting dummy capacitor are electrically connected with each other, so that the cell plates are electrically connected with the semiconductor substrate via the contact plugs.

61. The semiconductor device of Claim 60, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the conductive lower hydrogen-barrier films are formed on the insulative lower hydrogen-barrier film so as to cover the upper surfaces of the contact plugs.

62. The semiconductor device of Claim 60, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-

barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the end faces of the conductive lower hydrogen-barrier films are in contact with the insulative lower hydrogen-barrier film.

63. The semiconductor device of Claim 60, wherein the lower hydrogen-barrier film includes conductive lower hydrogen-barrier films and an insulative lower hydrogen-barrier film, wherein each said conductive lower hydrogen-barrier film is formed between each said cell-selecting transistor and each said capacitor, while the insulative lower hydrogen-barrier film is formed between the capacitor rows, and

the conductive lower hydrogen-barrier films are formed on the lateral faces of the contact plugs, so that the conductive lower hydrogen-barrier films are in contact with the insulative lower hydrogen-barrier film.

64. The semiconductor device of Claim 32, wherein the lower electrode or the upper electrode contains an element of the platinum group.

65. The semiconductor device of Claim 32, wherein the capacitive insulating film is made of a substance, which is expressed by the general formula $SrBi_2(Ta_xNb_{1-x})_2O_9$, $Pb(Zr_xTi_{1-x})O_3$, $(Ba_xSr_{1-x})TiO_3$, $(Bi_xLa_{1-x})_4Ti_3O_{12}$ (wherein $0 \leqq x \leqq 1$ in the formulas), or Ta_2O_5.

66. A method for fabricating a semiconductor device, comprising the steps of:

forming a plurality of cell-selecting transistors in a semiconductor substrate;

forming bit lines, which are electrically connected with the cell-selecting transistors, over the semiconductor substrate;

forming an insulative lower hydrogen-barrier film over the bit lines;

forming a plurality of first contact plugs, which pass through the insulative lower hydrogen-barrier film to reach the cell-selecting transistors;

selectively forming a plurality of conductive lower hydrogen-barrier films on the insulative lower hydrogen-barrier film so that the conductive lower hydrogen-barrier films cover the upper faces of the first contact plugs;

forming capacitor rows over the conductive lower hydrogen-barrier films, the capacitor rows including a plurality of capacitors each having a capacitive insulating film made of a ferroelectric material or a high dielectric material; and

forming an upper hydrogen-barrier film over the capacitor rows,

wherein the upper-hydrogen-barrier-film formation step includes the step of forming the upper hydrogen-barrier film in such a manner that the upper hydrogen-barrier film is in contact with the insulative lower hydrogen-barrier film where the insulative lower hydrogen-barrier film is located outside the capacitor rows.

67. The method of Claim 66, further comprising, after the upper-hydrogen-barrier-film formation step, the steps of:

forming an interlayer dielectric film over the entire surface of the semiconductor substrate as well as on the upper hydrogen-barrier film;

forming second contact plugs, which are connected to the bit lines, in portions in the interlayer dielectric film that are located outside the region where the upper hydrogen-barrier film has been formed; and

forming interconnects, which are in contact with the second contact plugs, on the

interlayer dielectric film.

68. The method of Claim 67, wherein the step of forming the second contact plugs in the interlayer dielectric film includes the steps of:

forming a lower interlayer dielectric film on the upper hydrogen-barrier film, and then forming a lower contact plug in the lower interlayer dielectric film, and

forming an upper interlayer dielectric film on the lower interlayer dielectric film, and then forming an upper contact plug, which is connected to the lower contact plug, in the upper interlayer dielectric film.

69. The method of Claim 66, wherein in the insulative-lower-hydrogen-barrier-film formation step, the insulative lower hydrogen-barrier film is formed directly on the bit lines.

70. The method of Claim 66, wherein a lower electrode, the capacitive insulating film, and an upper electrode in each said capacitor have a cross section of a recess, and the lateral faces of each said recess are tapered and flare upward.

71. The method of Claim 66, wherein in the upper-hydrogen-barrier-film formation step, the upper hydrogen-barrier film is formed directly on upper electrodes.

72. The method of Claim 66, further comprising the step of forming interconnects directly on the upper hydrogen-barrier film, after the upper-hydrogen-barrier-film formation step is performed.

73. The method of Claim 66, wherein the capacitor-row formation step includes the step of connecting upper electrodes of the capacitors with each other so that the upper electrodes form a cell plate, and electrically connecting an upper electrode and a lower electrode in one capacitor connected to the cell plate, thereby making said one capacitor be a conducting dummy capacitor whose upper and lower electrodes are electrically connected with each other.

74. A method for fabricating a semiconductor device, comprising the steps of:

forming a plurality of cell-selecting transistors in a semiconductor substrate;

forming bit lines, which are electrically connected with the cell-selecting transistors, over the semiconductor substrate;

forming a plurality of first contact plugs, which reach the respective cell-selecting transistors;

selectively forming a plurality of conductive lower hydrogen-barrier films on the first contact plugs so that the conductive lower hydrogen-barrier films cover the upper faces of the first contact plugs;

forming an insulative lower hydrogen-barrier film so that the insulative lower hydrogen-barrier film covers regions located alongside the conductive lower hydrogen-barrier films, and also covers the end faces of the conductive lower hydrogen-barrier films;

forming capacitor rows over the conductive lower hydrogen-barrier films, the capacitor rows including a plurality of capacitors each having a capacitive insulating film made of a ferroelectric material or a high dielectric material; and

forming an upper hydrogen-barrier film over the capacitor rows,

wherein the upper-hydrogen-barrier-film formation step includes the step of forming the upper hydrogen-barrier film in such a manner that the upper hydrogen-barrier

film is in contact with the insulative lower hydrogen-barrier film where the insulative lower hydrogen-barrier film is located outside the capacitor rows.

75. The method of Claim 74, further comprising, after the upper-hydrogen-barrier-film formation step, the steps of:

forming an interlayer dielectric film over the entire surface of the semiconductor substrate as well as on the upper hydrogen-barrier film;

forming second contact plugs, which are connected to the bit lines, in portions in the interlayer dielectric film that are located outside the region where the upper hydrogen-barrier film has been formed; and

forming interconnects, which are in contact with the second contact plugs, on the interlayer dielectric film.

76. The method of Claim 75, wherein the step of forming the second contact plugs in the interlayer dielectric film includes the steps of:

forming a lower interlayer dielectric film on the upper hydrogen-barrier film, and then forming a lower contact plug in the lower interlayer dielectric film, and

forming an upper interlayer dielectric film on the lower interlayer dielectric film, and then forming an upper contact plug, which is connected to the lower contact plug, in the upper interlayer dielectric film.

77. The method of Claim 74, wherein in the insulative-lower-hydrogen-barrier-film formation step, the insulative lower hydrogen-barrier film is formed directly on the bit lines.

78. The method of Claim 74, wherein a lower electrode, the capacitive insulating film, and an upper electrode in each said capacitor have a cross section of a recess, and the lateral faces of each said recess are tapered and flare upward.

79. The method of Claim 74, wherein in the upper-hydrogen-barrier-film formation step, the upper hydrogen-barrier film is formed directly on upper electrodes.

80. The method of Claim 74, further comprising the step of forming interconnects directly on the upper hydrogen-barrier film, after the upper-hydrogen-barrier-film formation step is performed.

81. The method of Claim 74, wherein the capacitor-row formation step includes the step of connecting upper electrodes of the capacitors with each other so that the upper electrodes form a cell plate, and electrically connecting an upper electrode and a lower electrode in one capacitor connected to the cell plate, thereby making said one capacitor be a conducting dummy capacitor whose upper and lower electrodes are electrically connected with each other.

82. A method for fabricating a semiconductor device, comprising the steps of:

forming a plurality of cell-selecting transistors in a semiconductor substrate;

forming bit lines, which are electrically connected with the cell-selecting transistors, over the semiconductor substrate;

forming an insulative lower hydrogen-barrier film over the bit lines;

forming a plurality of contact holes, which pass through the insulative lower hydrogen-barrier film to reach the cell-selecting transistors;

forming conductive lower hydrogen-barrier films on the wall and bottom faces of the contact holes so that the upper end portions of the conductive lower hydrogen-barrier films are in contact with the insulative lower hydrogen-barrier film, and then forming first contact plugs that include at least the conductive lower hydrogen-barrier films;

forming capacitor rows over the conductive lower hydrogen-barrier films, the capacitor rows including a plurality of capacitors each having a capacitive insulating film made of a ferroelectric material or a high dielectric material; and

forming an upper hydrogen-barrier film over the capacitor rows,

wherein the upper-hydrogen-barrier-film formation step includes the step of forming the upper hydrogen-barrier film in such a manner that the upper hydrogen-barrier film is in contact with the insulative lower hydrogen-barrier film where the insulative lower hydrogen-barrier film is located outside the capacitor rows.

83. The method of Claim 82, further comprising, after the upper-hydrogen-barrier-film formation step, the steps of:

forming an interlayer dielectric film over the entire surface of the semiconductor substrate as well as on the upper hydrogen-barrier film;

forming second contact plugs, which are connected to the bit lines, in portions in the interlayer dielectric film that are located outside the region where the upper hydrogen-barrier film has been formed; and

forming interconnects, which are in contact with the second contact plugs, on the interlayer dielectric film.

84. The method of Claim 83, wherein the step of forming the second contact plugs in the interlayer dielectric film includes the steps of:

forming a lower interlayer dielectric film on the upper hydrogen-barrier film, and then forming a lower contact plug in the lower interlayer dielectric film, and

forming an upper interlayer dielectric film on the lower interlayer dielectric film, and then forming an upper contact plug, which is connected to the lower contact plug, in the upper interlayer dielectric film.

85. The method of Claim 82, wherein in the insulative-lower-hydrogen-barrier-film formation step, the insulative lower hydrogen-barrier film is formed directly on the bit lines.

86. The method of Claim 82, wherein a lower electrode, the capacitive insulating film, and an upper electrode in each said capacitor have a cross section of a recess, and the lateral faces of each said recess are tapered and flare upward.

87. The method of Claim 82, wherein in the upper-hydrogen-barrier-film formation step, the upper hydrogen-barrier film is formed directly on upper electrodes.

88. The method of Claim 82, further comprising the step of forming interconnects directly on the upper hydrogen-barrier film, after the upper-hydrogen-barrier-film formation step is performed.

89. The method of Claim 82, wherein the capacitor-row formation step includes the step of connecting upper electrodes of the capacitors with each other so that the upper electrodes form a cell plate, and electrically connecting an upper electrode and a lower electrode in one capacitor connected to the cell plate, thereby making said one capacitor be

a conducting dummy capacitor whose upper and lower electrodes are electrically connected with each other.

90. A method for fabricating a semiconductor device, comprising the steps of:

forming a lower hydrogen-barrier film over a semiconductor substrate;

forming capacitor rows over the lower hydrogen-barrier film, the capacitor rows including a plurality of capacitors each having a capacitive insulating film made of a ferroelectric material or a high dielectric material;

forming an interlayer dielectric film covering the capacitor rows;

forming, in the interlayer dielectric film, an open trench exposing the lower hydrogen-barrier film where the lower hydrogen-barrier film is located outside the capacitor rows; and

forming an upper hydrogen-barrier film on the interlayer dielectric film so that the upper hydrogen-barrier film is in contact with the lower hydrogen-barrier film where the upper hydrogen-barrier film is on the bottom face of the open trench.

91. The method of Claim 90, wherein the step of forming the open trench in the interlayer dielectric film includes the step of forming a plurality of the open trenches in parallel with each other.

92. The method of Claim 90, wherein the open trench has a cross-sectional configuration that is tapered and flares upward.

93. The method of Claim 90, wherein in the lower-hydrogen-barrier-film formation step, the lower hydrogen-barrier film is formed directly on bit lines.

94. The method of Claim 90, wherein a lower electrode, the capacitive insulating film, and an upper electrode in each said capacitor have a cross section of a recess, and the lateral faces of each said recess are tapered and flare upward.

95. The method of Claim 90, wherein in the upper-hydrogen-barrier-film formation step, the upper hydrogen-barrier film is formed directly on upper electrodes.

96. The method of Claim 90, further comprising the step of forming interconnects directly on the upper hydrogen-barrier film, after the upper-hydrogen-barrier-film formation step is performed.

97. The method of Claim 90, wherein the capacitor-row formation step includes the step of connecting upper electrodes of the capacitors with each other so that the upper electrodes form a cell plate, and electrically connecting an upper electrode and a lower electrode in one capacitor connected to the cell plate, thereby making said one capacitor be a conducting dummy capacitor whose upper and lower electrodes are electrically connected with each other.

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98. A method for fabricating a semiconductor device, comprising the steps of:

forming a lower hydrogen-barrier film over a semiconductor substrate;

forming capacitor rows over the lower hydrogen-barrier film, the capacitor rows including a plurality of capacitors each having a capacitive insulating film made of a ferroelectric material or a high dielectric material;

forming a side-wall hydrogen-barrier film so that the side-wall hydrogen-barrier film covers the lateral portions of the capacitor rows, and is in contact with the lower

hydrogen-barrier film where the lower hydrogen-barrier film is located outside the capacitor rows; and

forming an upper hydrogen-barrier film so that the upper hydrogen-barrier film covers the top side of the capacitor rows, and is in contact with the side-wall hydrogen-barrier film.

99. The method of Claim 98, wherein a lower electrode, the capacitive insulating film, and an upper electrode in each said capacitor have a cross section of a recess, and the lateral faces of each said recess are tapered and flare upward.

100. The method of Claim 98, wherein in the upper-hydrogen-barrier-film formation step, the upper hydrogen-barrier film is formed directly on upper electrodes.

101. The method of Claim 98, further comprising the step of forming interconnects directly on the upper hydrogen-barrier film, after the upper-hydrogen-barrier-film formation step is performed.

102. The method of Claim 98, wherein the capacitor-row formation step includes the step of connecting upper electrodes of the capacitors with each other so that the upper electrodes form a cell plate, and electrically connecting an upper electrode and a lower electrode in one capacitor connected to the cell plate, thereby making said one capacitor be a conducting dummy capacitor whose upper and lower electrodes are electrically connected with each other.